

WHAT IS CLAIMED IS

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1. A method for remotely invoking functions in a distributed computing environment, comprising:

5 a client generating a message, wherein the message includes information representing a computer programming language method call;

10 the client sending the message to a service, wherein the service is configured to perform functions on behalf of the client; and

15 the service performing a function on behalf of the client in accordance with the information representing the computer programming language method call included in the message.

2. The method as recited in claim 1, wherein the service performs the function on behalf of the client asynchronously to processing on the client.

20 3. The method as recited in claim 1, wherein the client comprises a client method gate, wherein said generating a message comprises:

25 the client method gate receiving the computer programming language method call from a process executing within the client; and

the client method gate generating the message for the client.

4. The method as recited in claim 3, wherein said sending the message comprises the client method gate sending the message to the service.

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5. The method as recited in claim 4, wherein the process is executing within a virtual machine, wherein the virtual machine is executing within a client device in the distributed computing environment.

5 6. The method as recited in claim 5, wherein the virtual machine is a Java Virtual Machine (JVM).

10 7. The method as recited in claim 1, wherein the service comprises one or more computer programming language methods executable within the service, wherein said performing a function comprises executing a computer programming language method in accordance with the information representing the computer programming language method call included in the message.

15 8. The method as recited in claim 1, wherein the service comprises one or more computer programming language methods executable within the service, wherein the information representing the computer programming language method call includes an identifier of the method call, and wherein said performing a function comprises:

20 regenerating the method call in accordance with the identifier of the method call included in the information representing the method call; and

25 executing a computer programming language method in accordance with the regenerated method call.

30 9. The method as recited in claim 8, wherein the information representing the computer programming language method call further includes one or more parameter values of the method call, and wherein said executing a computer programming language method in accordance with the regenerated method call comprises providing the one or more parameter values from the information representing the method call as parameter values of the method call.

10. The method as recited in claim 8, wherein the service comprises a service method gate configured to provide an interface to computer programming language methods of the service by receiving messages and invoking methods specified by the messages, and
5 wherein said regenerating the method call is performed by the service method gate.

11. The method as recited in claim 1, wherein said performing a function generates results data, the method further comprising the service providing the generated results data to the client.

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12. The method as recited in claim 1, wherein said performing a function generates results data, the method further comprising:

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storing the generated results data to a space service in the distributed computing environment;

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providing an advertisement for the stored results data to the client, wherein the advertisement comprises information to enable access by the client to the stored results data; and

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the client accessing the stored results data from the space service in accordance with the information in the provided advertisement.

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13. The method as recited in claim 12, wherein the client accessing the stored results data comprises:

generating a client results message endpoint in accordance with the information in the provided advertisement, wherein the client results message endpoint is configured to send messages to the space service for the client;

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generating a results request message, wherein the results request message requests a portion of the results data to be provided to the client;

the client results message endpoint sending the results request message to the space service; and

the space service sending the requested portion of the results data to the client results message endpoint in response to receiving the results request message.

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14. The method as recited in claim 13, wherein the results request message is received on the space service by a space service results message endpoint, and wherein the space service sending the requested portion of the results to the client results message endpoint comprises:

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generating a results response message, wherein the results response message includes the requested portion of the results; and

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the space service results message endpoint sending the results response message to the client results message endpoint.

15. The method as recited in claim 12, wherein the information to enable access by the client to the stored results comprises one or more Uniform Resource Identifiers (URIs) for accessing the stored results.

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16. The method as recited in claim 1, wherein said computer programming language is the Java programming language, and wherein the information representing the method call in the message represents a Java method call to a Java method implemented on the service, and wherein the service performing a function comprises invoking the Java

method on the service in accordance with the information representing the Java method call included in the message.

5 17. A distributed computing system comprising:

a service device configured to execute functions on behalf of clients of the service device;

10 a client device configured to:

generate a message, wherein the message includes information representing a computer programming language method call; and

15 send the message to the service device;

wherein the service device is configured to:

receive the message sent by the client device; and

20 perform a function on behalf of the client device in accordance with the information representing the computer programming language method call included in the message.

25 18. The system as recited in claim 17, wherein the service device performs the function on behalf of the client device asynchronously to processing on the client device.

19. The system as recited in claim 17, wherein the client device comprises a client method gate executable within the client device, and wherein the client method gate is 30 configured to:

receive the computer programming language method call from a process executing within the client device; and

5 wherein said generating the message is performed on the client device by the client method gate, and wherein the information in the message represents the method call received from the process.

10 20. The system as recited in claim 19, wherein the client method gate is further configured to send the message to the service for the client device.

15 21. The system as recited in claim 19, wherein the client device further comprises a virtual machine executable within the client device, wherein the process is executing within the virtual machine.

22. The system as recited in claim 21, wherein the virtual machine is a Java Virtual Machine (JVM).

20 23. The system as recited in claim 17, wherein, in said performing a function, the service device is further configured to execute a computer programming language method in accordance with the information representing the computer programming language method call included in the message.

25 24. The system as recited in claim 17, wherein, in said performing a function, the service device is further configured to:

regenerate the computer programming language method call in accordance with an identifier of the method call included in the message; and

execute a computer programming language method in accordance with the regenerated method call.

25. The system as recited in claim 24, wherein, in said executing a computer
5 programming language method, the service device is further configured to provide one or
more parameter values included in the message as parameter values of the method call.

26. The system as recited in claim 17, wherein said performing the function generates
results data, and wherein the service device is further configured to provide the generated
10 results data to the client device.

27. The system as recited in claim 17, further comprising:

15 a space service device configured to receive and store results data from service
devices in the distributed computing system;

wherein said performing the function generates results data, and wherein the
service device is further configured to:

20 store the results data to the space service device; and

provide an advertisement for the stored results data to the client device,
wherein the advertisement comprises information to enable access
by the client device to the stored results data.

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28. The system as recited in claim 27, wherein the client device is further configured
to access the stored results data from the space service device in accordance with the
information in the provided advertisement for the stored results data.

29. The system as recited in claim 28, wherein, in said accessing the stored results data, the client device is further configured to:

5 generate a client results message endpoint in accordance with the information in the provided advertisement, wherein the client results message endpoint is executable within the client device, wherein the client results message endpoint is configured to:

10 generate a results request message, wherein the results request message requests a portion of the results data be provided to the client device; and

15 send the results request message to the space service device.

30. The system as recited in claim 29, wherein the space service device comprises a space service results message endpoint executable within the space service device and configured to:

20 receive the results request message; and

send a results response message to the client results message endpoint, wherein the results response message includes the requested portion of the results data.

25. The system as recited in claim 27, wherein the information to enable access comprises one or more Uniform Resource Identifiers (URIs) for accessing the stored results.

30. The system as recited in claim 17, wherein said computer programming language is the Java programming language, and wherein the information representing the method

call in the message represents a Java method call to a Java method implemented on the service, and wherein, in said performing a function, the service device is further configured to invoke the Java method on the service device in accordance with the information representing the Java method call included in the message.

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33. A device comprising:

a client component; and

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a method gate;

wherein the client component is configured to:

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generate a computer programming language method call;

wherein the method gate is configured to:

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access the computer programming language method call generated by the client component;

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generate a message, wherein the message includes information representing the computer programming language method call; and

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send the message to a service in a distributed computing environment;

wherein the service is operable to perform a function on behalf of the client component in accordance with the information representing the computer programming language method call included in the message.

34. The device as recited in claim 33, wherein the service is further operable to perform the function on behalf of the client component asynchronously to processing of the client component.

5 35. The device as recited in claim 33, wherein the device further comprises a virtual machine executable within the device, wherein the client component and the method gate are executable within the virtual machine.

10 36. The device as recited in claim 35, wherein the virtual machine is a Java Virtual Machine (JVM).

15 37. The device as recited in claim 33, wherein the service is further operable to store results data generated by the function to a space service in the distributed computing environment, and wherein the client component is further configured to:

20 access an advertisement for the results data, wherein the advertisement comprises information to enable access by the client component to the results data; and

25 access the results data from the space service in accordance with the information in the provided advertisement for the stored results data.

38. The device as recited in claim 33, wherein said computer programming language is the Java programming language, and wherein the information representing a method call in the message represents a Java method call to a Java method implemented on the service.

30 39. A device comprising:

a client component configured to generate a message, wherein the message includes information representing a computer programming language method call; and

5 a message endpoint configured to send the message to a service in a distributed computing environment;

wherein the service is operable to perform a function on behalf of the client component in accordance with the information representing the computer 10 programming language method call included in the message.

40. The device as recited in claim 39, wherein the service is further operable to perform the function on behalf of the client component asynchronously to processing of the client component.

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41. The device as recited in claim 39, wherein the client component is further configured to generate the computer programming language method call, and wherein said generating a message is performed in response to said generating the computer programming language method call.

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42. The device as recited in claim 39, wherein the device further comprises a virtual machine executable within the device, wherein the client component and the message endpoint are executable within the virtual machine.

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43. The device as recited in claim 42, wherein the virtual machine is a Java Virtual Machine (JVM).

44. The device as recited in claim 39, wherein the service is further operable to store results data generated by the function to a space service in the distributed computing 30 environment, and wherein the client component is further configured to:

access an advertisement for the results data, wherein the advertisement comprises information to enable access by the client component to the results data; and

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access the results data from the space service in accordance with the information in the provided advertisement for the stored results data.

45. The device as recited in claim 39, wherein said computer programming language 10 is the Java programming language, and wherein the information representing a method call in the message represents a Java method call to a Java method implemented on the service.

15 46. A device comprising:

a message endpoint configured to receive a message sent by a client of the device in a distributed computing environment, wherein the message includes information representing a computer programming language method call; 20 and

a service component configured to:

25 perform a function on behalf of the client in accordance with the information representing the computer programming language method call included in the message;

store results data generated by said performing a function to a space service in the distributed computing environment; and

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provide an advertisement for the stored results data to the client, wherein the advertisement comprises information to enable access by the client to the stored results data.

5 47. The device as recited in claim 46, wherein the service component performs the function on behalf of the client asynchronously to processing on the client.

48. The device as recited in claim 46, wherein the service component comprises a computer programming language method,

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wherein the message endpoint is further configured to:

regenerate the computer programming language method call in accordance with an identifier of the method call included in the message; and

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invoke the computer programming language method of the service component with the regenerated method call;

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wherein, in said performing a function, the service component is further configured to execute the computer programming language method in accordance with the regenerated method call in response to said invocation.

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49. The device as recited in claim 48, wherein, in said invoking the computer programming language method, the message endpoint is further configured to provide one or more parameter values included in the message as parameter values of the method call.

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50. The device as recited in claim 46, wherein said computer programming language is the Java programming language.

51. A carrier medium comprising program instructions, wherein the program instructions are computer-executable to implement:

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a client generating a message, wherein the message includes information representing a computer programming language method call;

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the client sending the message to a service, wherein the service is configured to perform functions on behalf of the client; and

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the service performing a function on behalf of the client in accordance with the information representing the computer programming language method call included in the message.

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52. The carrier medium as recited in claim 51, wherein the service device performs the function on behalf of the client device asynchronously to processing on the client device.

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53. The carrier medium as recited in claim 51, wherein the client comprises a client method gate, wherein, in said generating a message, the program instructions are further computer-executable to implement:

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the client method gate receiving the computer programming language method call from a process executing within the client; and

the client method gate generating the message for the client.

54. The carrier medium as recited in claim 53, wherein the process is executing within a virtual machine, wherein the virtual machine is executing within a client device in the distributed computing environment.

5 55. The carrier medium as recited in claim 54, wherein the virtual machine is a Java Virtual Machine (JVM).

10 56. The carrier medium as recited in claim 51, wherein the information representing the computer programming language method call includes an identifier of the method call, and wherein, in said performing a function, the program instructions are further computer-executable to implement:

15 regenerating the method call in accordance with the identifier of the method call included in the information representing the method call; and

executing a computer programming language method in accordance with the regenerated method call.

20 57. The carrier medium as recited in claim 56, wherein the information representing the computer programming language method call further includes one or more parameter values of the method call, and wherein, in said executing a computer programming language method in accordance with the regenerated method call, the program instructions are further computer-executable to implement providing the one or more parameter values from the information representing the method call as parameter values 25 of the method call.

58. The carrier medium as recited in claim 51, wherein the program instructions are further computer-executable to implement:

30 storing results data from said performing a function to a space service;

providing an advertisement for the stored results data to the client, wherein the advertisement comprises information to enable access by the client to the stored results data; and

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the client accessing the stored results data from the space service in accordance with the information in the provided advertisement.

59. The carrier medium as recited in claim 58, wherein, in the client accessing the
10 stored results data, the program instructions are further computer-executable to implement:

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generating a client results message endpoint in accordance with the information in the provided advertisement, wherein the client results message endpoint is configured to send messages to the space service for the client;

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generating a results request message, wherein the results request message requests a portion of the results data to be provided to the client;

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the client results message endpoint sending the results request message to the space service; and

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the space service sending the requested portion of the results data to the client results message endpoint in response to receiving the results request message.

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60. The carrier medium as recited in claim 51, wherein said computer programming language is the Java programming language, and wherein the information representing the method call in the message represents a Java method call to a Java method implemented on the service, and wherein, in said performing a function, the program instructions are

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further computer-executable to implement invoking the Java method on the service in accordance with the information representing the Java method call included in the message